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from a source which was contaminated shortly before the commencement of the epidemic. The farm where the disease existed was daily sending to the city one hundred and twenty gallons of infected milk. This subject has been considerably discussed in Edinburgh recently, and a letter from a physician which appeared in the daily press, recommending that all milk should be boiled five minutes, has resulted in the general adoption of the suggestion throughout the city. Scarlet-fever appears to be very prevalent in Edinburgh, there having been at one time one hundred and ninety-nine patients in the city fever-hospital.

YELLOW-FEVER INOCULATION. — Dr. Urricoechea, surgeon of a battalion in Colombia, inoculated five of his soldiers for the prevention of yellow-fever. Twenty minutes after the operation the temperature gradually ascended to 40° C., accompanied with all the symptoms of yellow-fever. This lasted forty hours, at the expiration of which the fever and all attendant symptoms had disappeared. At the present time the inoculated soldiers are exposed to the infection. Dr. Bustamente, a physician of Cucuta, Colombia, reports that he has inoculated forty persons, and in many of them a fever, with many of the characteristics of yellow-fever, has presented itself; this fever, developed by inoculation, varying several tenths of a degree, and in some cases ascending to 41° C., but never presenting the most grave symptoms of yellow-fever. Dr. Bustamente says that the result of his observations justifies him in stating positively that the fever produced by inoculation is attended with no danger, and that it is safe to inoculate, as he has already done, persons from the age of two years upwards. Many of the persons inoculated by him have been exposed to yellow-fever, and in no case has the fever attacked them.

GELATINE LIQUEFACTION BY BACTERIA. — Dr. Sternberg has been studying the liquefaction of gelatine by bacteria, and has ascertained that it is due to a soluble chemical product which is formed during the active growth of the liquefying organisms, and that a comparatively small amount of this substance will liquefy gelatine quite independently of the living organism. Dr. Sternberg expresses the hope that some chemist will take up the question with a view to ascertaining the exact nature of this substance.

WATER-FILTRATION. — A very interesting series of experiments in the filtration of water has recently been made by Dr. G. T. Swarts, and reported by him to the Rhode Island medical society. He finds that, when first used, some filters successfully remove some of the organisms which

the water contains, but that tests made seventeen days later showed in every instance a marked increase in the number in the filtered as compared with the unfiltered water. In one case the unfiltered water contained thirty-six colonies, and after passing through the filter there were 2,000; in another case the number was 10,000. An examination made on the seventieth day showed the number of colonies increased to 117,000. The explanation of these results is, that, in passing through the filter, some of the micro-organisms present in the water are retained in the filter, and at the same time some of the albuminoids which are present are also retained. These latter serve as pabulum for the micro-organisms, and the latter increase enormously under these favorable conditions, and water subsequently passing through the filter takes them up in large numbers. With every possible precaution in sterilizing and cleansing the filter, the number of organisms in filtered water exceeded those in unfiltered by several thousands; especially is this marked if the filter is in a warm room or in proximity to a hot-water pipe. While the bacteria ordinarily found in water are harmless, still it is possible that those of cholera or typhoid-fever might be present in drinking-water; and the practical application of these observations of Dr. Swarts is, that such germs would not only not be filtered out in the process of filtration, but that their number would probably increase many times in the filter itself. The filtration of water is therefore of no use when the presence of pathogenic organisms is suspected; and recourse should, under such circumstances, be had to boiling, it having been abundantly demonstrated that all organisms in water are destroyed at the boiling-point, if that temperature is maintained for one hour.

THE HUMAN FACULTIES.

Mind and muscle.

THE full significance of the modern view of the relation of body to mind is well brought home by the success of a recent experiment upon a dozen dull, sluggish, shiftless, illiterate inmates of the Elmira reformatory. The men were not exactly feeble-minded, but were dull and stupid, had made no progress in school-work, and seemed incapable of a prolonged mental effort. The class was formed on June 5 of 1886, when the men were, on the average, 22.9 years old; they had been committed for rather low orders of crimes, for which the law would have imposed an average sentence of about seven years; had one and all never learned a trade; and exhibited the usual amount of intemperance, hereditary taint, and lack of moral

development, which can be plainly read on the typical physiognomy of a criminal. Their average weight was 134 pounds; their height, 5 feet 4½ inches; and chest-girth, 32¾ inches. They were subjected to a carefully selected and weighed diet, to water and vapor baths, to kneading and massage; underwent a systematized training in dumb-bell and other gymnastic exercises; were drilled in keeping step and marching; and altogether lived (outside of the usual shop-work) very much the life of an athlete under training. As was to be expected, the first effect was a decrease in weight (of 4.37 pounds on July 1); but on Nov. 6, when the class discontinued, the average increase of weight was 1.23 pounds. Their muscles, previously soft and flabby, were now hardened and active; their shuffling gait was abandoned for an elastic walk; the dull and stolid look gave way to a brighter and more intelligent expression. But a special object was to see the effect of all this on their mental capabilities. When they began, one could neither read nor write; a second could barely do so; four understood long-division, but not well enough to get a correct answer; while the rest were wrecked before finishing simple division. Their average work in the school register prior to this experiment was 45.25 out of a possible 100; during the five months of training it was 74.16. Add to this the statement of the instructors, that the numbers fail to express the real improvement which their actions and spirit portrayed, and one appreciates the real success of this valuable experiment. Of course, the dullards were not made scholars, and to mentally awaken men of 23 is a different task from arousing a growing boy; but it shows that even in this low type of humanity there is a latent mental power capable of being acted upon for the good of its owner.

The rationale of this process, modern physiology can well explain. The muscles are connected by nerves with motor centres in the brain: they are the organ of the will, because their contraction is under the control of the brain-centres. When we exercise a muscle, we not only make it grow and develop, but we also strengthen the brain-centre that controls it. The language of the muscles appeals to the very root of human nature: the first step in educating idiots is to get them to move their limbs in an orderly way and at command, to educate their motor centres. Just so the dull brains of these criminally inclined men can be best aroused by arousing their motor centres. This effects a more vigorous vitality of the whole brain, and is the first step towards a higher psychic life.

Dr. Wey, to whom the credit of this painstaking work belongs, appends to his story separate

photographs and a composite (unfortunately a poor one) of the group which will bear out the description of the men above outlined.

TRAITS OF CRIMINALS. — An Italian scientist, Marro, finds that criminals are more apt than normal people to be the descendants of very young and of very old parents in opposition to parents of middle age; and the same is true of the insane. In a table founded on 1,865 normal men, 456 criminals, and 100 insane, 8.8 per cent of normal men were born of parents in the growing period of life, 66.1 per cent of parents in the period of maturity, and 24.9 per cent of parents who had already reached the declining period of life. Similar percentages for criminals are 10.9, 56.7, and 32.2; and for the insane, 17.0, 47.0, and 36.0. The same writer also finds that the bodily temperature of criminals is slightly higher than that of normal persons, being about 37°.07 C. in thirty cases which he examined.

THE WRITING AND PRINTING OF THE DERANGED. — The manuscripts of neuropaths — a word wide enough to include the slight and the severe disturbances of mental sanity — present certain typical characteristics. They abound in italicized words; in exclamation-points and punctuations after almost every word; in frequent use of capitals; in various sizes of writing, particularly much very large writing; and the like. It is not often that such people have the opportunity of going to print and converting the compositor to their peculiar system of typography. M. Richet prints a few specimen pages of such an author, and counts twelve different kinds of letters in seventeen lines, besides the usual capitals, exclamation-points, and so on, in great abundance. All this is significant of an excited, prancing state of mind, closely allied to delirium and mania.

COLORS SOUNDS. — Mr. Galton, in his 'Inquiries into human faculty,' has collected a number of very interesting and strange cases of persons to whom certain sounds always call up certain colors. In one case a whole language was developed for translating colors into sound and back again, and this favored individual could read words out of a wall-paper pattern, or paint a pattern to order to represent a word. Two French writers, Lauret and Duchaussoy, recently describe a case the peculiarity of which is its hereditary character. The gentleman in question has colors for articulated sounds, but not for musical ones. Both his son and daughter have a similar faculty. The father and daughter agree quite closely on the colors going with the vowel and consonant sounds; but the names of the numerals

are quite exceptional. While words seemed colored to them only when spoken very slowly and separately, and then simply take on the colors of the component sounds, particularly the vowels, the names of the numerals have distinct colors which are entirely different in father and daughter. Intense thought of a sound can bring up the color just as really hearing it does.

EXPLORATION AND TRAVEL.

Stanley's march.

ADVICES from Bansa-Manteka (about midway between Banana and Stanley Pool), dated March 29, say, "Mr. Henry M. Stanley, with his expedition for the relief of Emin Bey, has arrived here. All the members of the party are well. Mr. Stanley has decided to take a route by way of Stanley Falls for Emin's camp at Wadelai. He will restore the authority of the International association at Stanley Falls, install Tippu-Tip, and afterward ascend the Mburu, which is now known to be for a great part navigable. At the point where navigation ceases, the caravan will start across the country, striking the Albert Nyansa at Murswur, where Stanley intends to form a fortified camp, and then send in advance boats to inform Emin of the arrival of the expedition, and solicit transportation to Wadelai by Emin's two steamers. The caravan, which presents an imposing spectacle, is about to leave here for Leopoldville. Four bodies consisting of twenty-five men each, commanded by Europeans, will go in advance to drive off the marauders resting the route. The association's steamer the Stanley, the Livingstone mission steamer Henry Read, and the trading steamer Florida, will wait at Leopoldville to carry the expedition to the upper Kongo. The enterprise has caused a sensation among the natives. Many men from the factories at Banana and Boma are flocking to join the expedition, news having spread of the return of the 'white prophet' who will restore order among the people."

This report confirms the views expressed in some letters on the state of affairs on the Kongo, published by the Paris geographical society, to which we referred in *Science* of April 1, saying that the intercourse on both banks of the Kongo as far as Stanley Pool was interrupted by the natives attacking the caravans. Slow though the progress be, we may hope, however, that the Kongo association will succeed, after all, in opening central Africa to commerce. Even the bitterest enemy of the association cannot deny that great progress has been made since the first steps of opening the Kongo route were taken. Though

the aspect is not so glowing as the association represents, we are confident of the final success of the numerous efforts for gaining a foothold in the Kongo basin.

Stanley's route leads through one of the most unknown parts of Africa, the exploration of which will lead to the discovery of the watershed between the upper Kongo and the Mvutan Nsige.

NOTES AND NEWS.

THE Congress of German teachers, to be held at Gotha during the latter part of this month, will discuss the following questions: 1. In what respects can the school contribute to the solution of the social question? 2. Is the standard of morality among the masses higher than formerly, and, if so, how much of the credit of this is due to schools? 3. What external circumstances have a beneficial, and what have a detrimental, effect upon the work of the teacher? 4. How can history be used as a means of forming character? 5. The teacher as educator. 6. Is the continuance of public examinations desirable or not? 7. The educational value of singing. 8. The regular hygienic inspection of the school by a physician. 9. Educational walks with the pupils as object-lessons. 10. Instruction and reading books on the principle of the *Realschule*. 11. Discipline the *sine quâ non* of school-education. 12. Refuges for boys and girls. 13. Reformatory education. 14. The education of girls. 15. The need for a general simplification in the present spelling. 16. The exercise of the franchise by the teacher, both at general and municipal elections, is of the highest importance.

— The schools of Vienna are henceforth to give instruction in civics as part of the regular elementary teaching. This step is taken in accordance with a municipal decree.

— The prize of 25,000 francs, offered by the King of the Belgians for the best essay on the best means of improving the study and the teaching of geography, has been awarded to Anton Staubers, professor at the gymnasium at Augsburg.

— Sir Henry Sumner Maine, well known as the author of 'Early history of institutions,' 'Ancient law,' and 'Popular government,' has been chosen Whewell professor of international law at the University of Cambridge, in succession to Sir William Vernon Harcourt, resigned.

— Lord Rosebery is to be the Liberal candidate for the lord-rectorship of Glasgow university at the next election.

— Vienna university has now 6,135 students on its books.